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Application : <u>10613877</u>	Examiner : <u>Chin</u>	GAU : <u>2634</u>
From : <u>APB</u>	Location : <u>IDC</u> FMF FDC	Date : <u>07/11/05</u>
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REV 10/04

Attorney Docket No.: PD-203021
Customer No.: 020991

Patent

10/613877

BIT LABELING FOR AMPLITUDE
PHASE SHIFT CONSTELLATION USED WITH
LOW DENSITY PARITY CHECK (LDPC) CODES

RELATED APPLICATIONS

[01] This application is related to, and claims the benefit of the earlier filing date under 35 U.S.C. § 119(e) of, U.S. Provisional Patent Application (Serial No. 60/393,457) filed July 3, 2002 (Attorney Docket: PD-202095), entitled "Code Design and Implementation Improvements for Low Density Parity Check Codes," U.S. Provisional Patent Application (Serial No. 60/398,760) filed July 26, 2002 (Attorney Docket: PD-202101), entitled "Code Design and Implementation Improvements for Low Density Parity Check Codes," U.S. Provisional Patent Application (Serial No. 60/403,812) filed August 15, 2002 (Attorney Docket: PD-202105), entitled "Power and Bandwidth Efficient Modulation and Coding Scheme for Direct Broadcast Satellite and Broadcast Satellite Communications," U.S. Provisional Patent Application (Serial No. 60/421,505), filed October 25, 2002 (Attorney Docket: PD-202101), entitled "Method and System for Generating Low Density Parity Check Codes," U.S. Provisional Patent Application (Serial No. 60/421,999), filed October 29, 2002 (Attorney Docket: PD-202105), entitled "Satellite Communication System Utilizing Low Density Parity Check Codes," U.S. Provisional Patent Application (Serial No. 60/423,710), filed November 4, 2002 (Attorney Docket: PD-202101), entitled "Code Design and Implementation Improvements for Low Density Parity Check Codes," U.S. Provisional Patent Application (Serial No. 60/440,199) filed January 15, 2003 (Attorney Docket: PD-203009), entitled "A Novel Solution to Routing Problem in Low Density Parity Check Decoders," U.S. Provisional Patent Application (Serial No. 60/447,641) filed February 14, 2003 (Attorney Docket: PD-203016), entitled "Low Density Parity Check Code Encoder Design," U.S. Provisional Patent Application (Serial No. 60/456,220) filed March 20, 2003 (Attorney Docket: PD-203021), entitled "Description LDPC and BCH Encoders," U.S. Provisional Patent Application, ^(Serial No. 60/469356) filed May 9, 2003 (Attorney Docket: PD-203030), entitled "Description LDPC and BCH Encoders," U.S. Provisional Patent Application, ^(Serial No. 60/482112) filed June 24,

7.20.05

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2003 (Attorney Docket: PD-203044), entitled "Description LDPC and BCH Encoders," and U.S. Provisional Patent Application, ^(Serial No. 60/482107) filed June 24, 2003 (Attorney Docket: PD-203059), entitled "Description LDPC and BCH Encoders"; the entireties of which are incorporated herein by reference.

FIELD OF THE INVENTION

[02] The present invention relates to communication systems, and more particularly to coded systems.

BACKGROUND OF THE INVENTION

[03] Communication systems employ coding to ensure reliable communication across noisy communication channels. These communication channels exhibit a fixed capacity that can be expressed in terms of bits per symbol at certain signal to noise ratio (SNR), defining a theoretical upper limit (known as the Shannon limit). As a result, coding design has aimed to achieve rates approaching this Shannon limit. Conventional coded communication systems have separately treated the processes of coding and modulation. Moreover, little attention has been paid to labeling of signal constellations.

[04] A signal constellation provides a set of possible symbols that are to be transmitted, whereby the symbols correspond to codewords output from an encoder. One choice of constellation labeling involves Gray-code labeling. With Gray-code labeling, neighboring signal points differ in exactly one bit position. The prevailing conventional view of modulation dictates that any reasonable labeling scheme can be utilized, which in part is responsible for the paucity of research in this area.

[05] With respect to coding, one class of codes that approach the Shannon limit is Low Density Parity Check (LDPC) codes. Traditionally, LDPC codes have not been widely deployed because of a number of drawbacks. One drawback is that the LDPC encoding technique is highly complex. Encoding an LDPC code using its generator matrix would require storing a very large, non-sparse matrix. Additionally, LDPC codes require large blocks to be effective; consequently,